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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/241,695 02/02/99 MIYANAGA

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MM12/0730

EXAMINER

HU, S

ART UNIT

PAPER NUMBER

2811

DATE MAILED:

07/30/99

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/241,695

Applicant
Miyanaga et al.

Examiner
Shouxiang Hu

Group Art Unit
2811



☒ Responsive to communication(s) filed on Jun 10, 1999

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire three month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1-26 is/are pending in the application.

Of the above, claim(s) 5-13, 16, 17, 19, 20, 22, 23, 25, and 26 is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-4, 14, 15, 18, 21, and 24 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☒ received.

☐ received in Application No. (Series Code/Serial Number) _____

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

1. Claims 5-13, 16-17, 19-20, 22-23 and 25-26 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b) as being drawn to a non-elected invention. Election was made **without** traverse in Paper No. 5.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 14-15, 18, 21 and 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Chang.

Regarding claims 1 and 15, Chang discloses (Figs. 1-3) a semiconductor IC device comprising MOSFETs and each of the MOSFETs comprising:

a source region; a drain region; a channel forming region between the source and drain regions;

an impurity region (18 or 28) being added with an impurity having an opposite conductive type to the source and drain regions and being formed under the channel forming region.

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Although Chang does not specifically disclose that the concentration of the impurity in the channel forming region is from $1/100$ to $1/10$ of that in the impurity region, it is noted that the ratio of impurity concentrations in these two regions in Chang's MOSFETs is substantially close or within the range of $1/100$ to $1/10$, given the disclosed doping dosage and the doping pocket broaden range and the typical impurity concentration in a non-heavily doped channel forming region. In general, the impurity concentrations of the doped regions are well recognized variables of importance, their specific amounts and the ratio between them are subject to routine experimentation and optimization.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make Chang's semiconductor device with the concentration of the impurity in the channel forming region is from $1/100$ to $1/10$ of that in the impurity region during routine design and process optimization, so that faster switch speed and increased punchthrough voltage would be achieved.

Regarding claims 2-4, the impurity concentrations in the channel forming region and in the impurity region are recognized variables of importance in Chang's disclosure and they are subject to routine experimentation and optimization.

Regarding claims 14, Chang's semiconductor device further comprises a pair of LDD region (14)

Regarding claims 18, 21 and 24, it is noted that it is old and well known in the art that semiconductor devices having MOSFETs with short channels can be used in microprocessors,

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including RISC or ASIC ones, and can be applied in cellular phones, personal handy phone systems and portable computers. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the semiconductor device and apply it to the above areas for achieving improved performance/cost combination in these areas.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References B and U are being cited since they show some punchthrough stopper structures pertinent to the claimed invention.

5. Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 or 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to ***Shouxiang Hu*** whose telephone number is **(703) 306-5729**. The Examiner is in the Office generally between the hours of 8:00AM to 6:00PM (Eastern Standard Time) Monday through Thursday.

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Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **(703) 308-0956**.

Shouxiang Hu

July 28, 1999

A handwritten signature in black ink that reads "Tom Thomas". The signature is written in a cursive, slightly stylized font.

Tom Thomas
Supervisory Patent Examiner
Technology Center 2800